

Profitability of Corporate Acquisitions and the Acquisition Premium and Goodwill

Abstract

We examine the unresolved questions of whether corporate acquisitions create synergistic gains in the form of post-merger abnormal operating performance and whether the accounting goodwill is associated with post-merger operating performance. By disentangling the purchase accounting effect, we propose an adjusted cash flow performance measure to be used consistently over the pre- and post-merger periods. Using the adjusted performance measure and difference-in-difference approach, we reconcile the conflicting results from prior studies (Healy, Palepu, and Ruback, 1992; Ghosh, 2001). We document evidence that post-merger operating cash flow performance of the merged firms increases in comparison with the control firms matched by pre-merger performance and size. We also find that the size of the accounting goodwill and acquisition premium varies directly with post-merger operating performance. Such evidence suggests that acquiring firms which pay higher acquisition premium experience a corresponding higher cash flow return following the corporate acquisition and that the accounting goodwill represents future benefits.

1. Introduction

This study examines whether corporate acquisitions create economic gains in the form of post-merger abnormal operating performance and whether there is an association between the accounting goodwill and post-merger operating performance. Corporate acquisitions are among the most significant investment activities of a firm and perhaps the most impactful resource allocation decisions (Harford and Li, 2007; Shalev, 2009). Typically, acquirers pay a substantial acquisition premium beyond the net asset value of the target company, and the premium is recorded as goodwill in the acquirers' balance sheet under the U.S. GAAP.¹ Given the significance of the acquisition decision and the size of the acquisition premium, an issue of great interest is whether corporate acquisitions provide synergistic gains which translate into higher future profitability. The existing evidence is mixed and inconclusive, however, about whether corporate acquisitions in the U.S. improve the combined firm's post-merger operating performance. Furthermore, little empirical evidence exists about whether there is a link between the accounting goodwill and post-merger operating performance to justify a recognition of goodwill. This paper fills this gap by documenting consistent and persuasive evidence of post-merger abnormal operating performance improvement and its association with accounting goodwill.

A large body of research investigates the motives and consequences of mergers and acquisition (M&A) activities. Many such studies examine the long-term stock performance of the acquiring firms following the acquisition or the short-term stock returns surrounding the M&A announcement. However, studies focusing on short- or long-term stock price performances are typically unable to determine whether corporate acquisitions create real economic gains. The vast majority of the studies examining daily stock return performance around the M&A announcement shows consistent results that corporate acquisition generally increases the equity value of the combined firm. That is, on average, the target shareholders receive a premium over their stand-alone market value, whereas the acquirers' stock prices stay relatively

¹ In our sample acquisitions, acquirers pay 54% of the total purchase price as a deal premium. Shalev (2009) reports 55% of the purchase price is paid and recorded as goodwill. Shalev, Zhang, and Zhang (2013) also report goodwill is the largest asset recorded, accounting for 59% of the purchase price on average. More details are in 4.1.

unchanged. The increase in the equity values of the target or the combined firm is typically attributed to some unmeasured source of real economic gains such as synergy (Healy, Palepu, and Ruback, 1992). Nevertheless, many studies that investigate post-merger financial performance (e.g., Ravenscraft and Scherer 1987; Herman and Lowenstein 1988) conclude that firm performance does not improve following the acquisition. On the other hand, more recent studies such as Healy et al. (1992) and Ghosh (2001) offer conflicting conclusions. Collectively, prior studies are unable to establish a conclusive connection between the acquisition premium and the expected improvement in post-merger performance. As a result, there is no consensus on whether corporate acquisitions improve operating performance and whether the (target's) equity value increases owing to real economic gains or some capital market inefficiencies (e.g., overpayment).

This study seeks to bring more clarity to the unresolved questions discussed above. First, we point out that the standard approach of normalizing the operating performance by the market value of assets, as in Healy et al. (1992) and Ghosh (2001), is ill-suited to detect synergistic gains from mergers. This is because the market value of assets is a forward-looking measure which reflects an unbiased expectation of all future acquisition-related gains. In an efficient market, a fully-valued asset would generate, on average, no more than a normal return. Because the denominator is already fully-valued (i.e., “marked to market”), the operating cash flow performance measure (the numerator) scaled by the market value should exhibit *normal* returns from the merger even if a merger generates synergistic gains. Thus, the absence of above-average post-merger returns documented based on the merging firm's operating performance could be attributed to the inappropriate use of the deflator.

We propose that both pre- and post- operating performances should be measured consistently by accounting rates of return which represent the recoveries from invested resources (input values) rather than market values (output values). Because of the nature of M&A accounting, however, it is also inappropriate to use the reported book value of assets as a denominator for measuring performance. Since July 1, 2001, the purchase accounting approach is the only allowable M&A accounting method under the U.S. GAAP. An interesting but rarely discussed aspect of the purchase accounting approach is that the target's balance

sheet is marked-to-market upon the merger, whereas the acquirer's balance sheet continues to be valued on the historical cost basis.² As a result, the combined company's balance sheet is a mixture of historical cost accounting and marked-to-market accounting. For this reason, it is also inappropriate to use the *reported* book value of assets as a basis for measuring post-merger operating performance on a consistent basis.

To make the post-merger performance measures comparable to the pre-merger measures, we disentangle the effect of purchase accounting and use the firm fixed-effect difference-in-difference (DID) approach to control for unobserved firm characteristics. Compared with prior studies which typically employ simple cross-sectional regressions, the DID approach better controls for the time-invariant firm-specific factors that can be correlated with the firm's operating performance. After removing the purchase accounting effect and using the DID approach, we document evidence that the merged firms show an increase in post-merger operating cash flow performance in comparison with the control firms matched by pre-merger performance and size.

The second question is whether the acquisition premium is associated with the post-merger economic gain, which is often considered as synergy. Under the U.S. Financial Accounting Standards Board (FASB)'s purchase accounting approach, the acquisition premium is defined as the difference between the actual purchase price paid and the fair value of the target firm's identifiable assets before the acquisition. The difference is recorded as goodwill in the acquirer's balance sheet, designating an economic resource capable of producing future cash inflows (FASB, 2010). The purchased goodwill cannot be exchanged for something else of value to the acquirer, nor can it be used to settle the acquirer's liabilities. However, it captures the economic value to the acquirer, namely, future benefits (cash flows). Johnson and Petrone (1998) provide a comprehensive discussion about whether goodwill can be recognized as an asset, but observe that "Although it [goodwill] lacks the ability singly to contribute directly to future net cash flows, it has the capacity in combination with other assets to contribute indirectly to those cash flow." Thus, to

² We discuss M&A accounting in Section 2.2. In brief, the target's net assets (assets less liabilities) are reappraised (usually upward) and the remaining difference between the offer price and the appraised net asset value is added to the combined company's balance sheet in the form of goodwill.

the extent that an acquiring firm was correct in choosing the target as a positive net present value investment, the purchased goodwill should be positively associated with the acquisition-induced subsequent abnormal operating performance. On the other hand, managerial incentives to overpay in corporate acquisitions are well-documented in the literature (Harford and Li, 2007; Shalev, 2009), and the size of the acquisition premium also depends on such factors as the presence of other bidders, competition within the industry, and ulterior incentives of bidders and targets. If a merger is triggered by adverse selection or empire building, it can be a value-destroying negative-NPV project. Since goodwill is a difference between the purchase price and the fair value of the tangible assets, overpayment for the target is also included in the goodwill.³ Therefore, the association between future economic benefits and the purchased goodwill can be trivial, to the extent that goodwill comprises mostly an overpayment due to market frictions and agency costs. This question is important because, in recent years, there are concerns that enormous goodwill is recorded as an asset.⁴ If goodwill does not translate into real economic benefits in the post-merger period, it is inappropriate to recognize goodwill as an asset.

Although goodwill represents a premium paid over the target's net asset value, it differs from the market-based acquisition premium discussed in corporate finance. The (market-based) acquisition premium is typically defined as the difference between the offer price and the target's stock price before the acquisition. Because the target's pre-merger stock price (market value) can be greater or less than its net asset value (which approximates the replacement cost), goodwill does not equate with the market-based premium.⁵ Nevertheless, we find that both goodwill and market-based acquisition premium are positively associated with the improvement in post-merger operating performance using a panel data of 1,480 firm-year observations from 148 U.S. corporate acquisitions that occur during the period from July 2001 to 2011.

³ Shalev, Zhang, and Zhang (2013) also find that managers have the incentive to overvalue goodwill and undervalue other assets, resulting in lower subsequent depreciation and amortization expenses on other assets.

⁴ "Today, there is more than \$2.5 trillion in goodwill on corporations' balance sheets." (Atwater, 2016) (<http://time.com/4376607/microsoft-linkedin-goodwill>)

⁵ See the conceptual difference between the two acquisition premia in Appendix 2.

This study contributes to the existing literature in three ways. First, we point out that there is a unique accounting problem because the acquired firm's balance sheet is marked-to-market, whereas the parent company's balance sheet remains at historical cost.⁶ We note that such an unusual circumstance necessitates an approach to disentangle the purchase accounting effect and construct an unbiased cash flow performance measure to be used consistently over the pre- and post-merger periods. Second, we provide evidence regarding the critical and unanswered question of whether an M&A creates or destroys value and reconcile the mixed results in prior studies. More specifically, by using the adjusted performance measure and a DID approach, we provide persuasive empirical evidence that operating performance improves following corporate acquisitions. Such evidence informs not only finance researchers and practitioners but also accounting researchers, as it supports the argument that goodwill is a productive asset that deserves to be recognized on the balance sheet. The result also attests to the usefulness of purchase price allocation disclosure in a sense that the goodwill disclosed long before the merged firms create operational synergies may have predictability for the future operating performance of the combined firm. Third, this paper demonstrates the need to adjust for the purchase accounting effect on performance measures such as ROA (return on assets), ROE, Tobin's q , and book-to-market ratios, when such measures are used to compare performance across firms and over time. For example, many M&A studies use changes in the operating performance of the combined company from pre- to post-mergers without making the necessary adjustment. Typically, changes in ROA around mergers has been used as non-market based measures in the M&A literature to proxy for merger performance and M&A quality (For example, Chen, Harford, and Li, 2007; Wang and Xie, 2009; Lin, Officer, and Zou, 2011; Fu, Lin, and Officer, 2013; Goodman, Neamtui, Shroff, and White, 2014; Cai, Kim, Park, and White, 2016). Similar comments apply to comparisons of Tobin's q and book-to-market ratio, as book values are inconsistent over time and across-firms owing to the application of SFAS 141 (2001). To the best of our knowledge, none of these studies consider the purchase

⁶ For simplicity, we assume that target shareholders absorb all synergistic gains and takeover premiums. Our conclusions are unaffected when we assume that both the parent and the target share the gains because the combined firm's market values reflect such gains.

accounting effect on the operating performance measure. Given the large size of goodwill and asset write-up, it is important to account for the goodwill and asset write-up when measuring changes in operating performance around mergers.

The rest of the paper proceeds as follows. Section 2 discusses the relevant literature and addresses the methodological issues in examining the corporate acquisition effect on post-merger performance. Section 3 presents the test hypotheses and research design. Section 4 explains the sample selection procedure. Section 5 presents the results and Section 6 provides additional analysis results. Conclusions are in Section 6.

2. Related literature and Methodologies

Earlier studies which examine post-merger operating performance, including Ravenscraft and Scherer (1987) and Herman and Lowenstein (1988), conclude that firm performance does not improve following the acquisition. Healy et al. (1992) point out a few methodological problems associated with both studies as well as small sample size, and analyze the changes in operating performance around acquisitions using the largest 50 acquisitions during January 1979 and June 1984. They use pretax operating cash flow, rather than accounting earnings, to measure operating performance because cash flows are unaffected by the method of payment and the method of accounting. Healy et al. (1992) conclude that cash flow performance does improve following the acquisition, unlike Ravenscraft and Scherer (1987) and Herman and Lowenstein (1988).

This Healy et al. (1992) approach has been de facto standard for many later studies that examine operating performance changes after merger (Mitchell and Mulherin, 1996; Fu, Lin, and Officer, 2013), as well as for other corporate transactions such as share buybacks and privatization (Nohel and Tarhan 1998; Boubakri and Cosset 1998). Fu, Lin, and Officer (2013), for example, fail to find evidence of positive synergies. Rather, mergers initiated by overvalued acquirers suffer deterioration in return on assets whereas those executed by non-overvalued acquirers show no improvement.⁷

⁷ They suggest CEO compensation, not shareholder value creation explains the main motive behind acquisitions.

In a subsequent paper, Ghosh (2001) points out that Healy et al. (1992)'s research design benchmarking on industry-median firms is problematic. Ghosh (2001) notes that inferences are likely to be biased because the acquiring firms tend to outperform the industry-median firms systematically during the pre-merger years. As a result, Ghosh (2001) recommends matching the acquiring firms based on pre-merger performance and size in the spirit of Barber and Lyon (1996). Using the same cash flow measures as Healy et al. (1992), he shows that the acquiring firms' post-merger operating cash flow *does not increase* when firms are matched based on the pre-merger operating performance. In sum, it is unclear whether the post-merger operating performance improves and whether such improvement is related to the merger premiums, as illustrated by the two representative studies by Healy et al. (1992) and Ghosh (2001).

This study builds on Healy et al. (1992) and Ghosh (2001) but uses a different methodological approach. We explain below how our approach helps reconcile the conflicting results advanced in previous studies.

2.1. Methodological issues

Healy et al. (1992) employ a *cross-sectional* regression model to assess operating performance improvement following an acquisition. They regress post-merger, industry-adjusted operating performance on pre-merger, industry-adjusted operating performance as follows.

$$IACR_{post,i} = \alpha + \beta * IACR_{pre,i} + \varepsilon_i, \quad (1)$$

where $IACR_{post,i}$ and $IACR_{pre,i}$ are, respectively, the median industry-adjusted cash flow returns on assets during the post- and the pre-merger periods, for acquisition i . Since the slope coefficient β captures any correlation (persistence) in cash flow performance between the pre- and post-merger periods, $\beta * IACR_{pre,i}$ controls for the effect of the persistent effects of pre-merger performance on the post-merger performance. Thus, according to Healy et al. (1992), the intercept α , which is independent of pre-merger performance, is an estimate of the average improvement in performance. Healy et al. (1992) report a

positive and statistically significant estimate of the intercept α , and conclude that the merged firms' post-merger operating cash flow returns increased in comparison with their industries.

If β is constrained to be equal to one, the improvement in performance is estimated as the average change in industry-adjusted cash flow returns between pre- and post-merger.

$$IACR_{post,i} - IACR_{pre,i} = \alpha + \varepsilon_i \quad (2)$$

$$(IACR_{post,i} - IACR_{pre,i}) = \alpha \quad (2)'$$

This approach that constrains the coefficient β to be unity is called the *change* model advocated by Ghosh (2001). Healy et al. (1992) argue that their unrestricted regression model is superior to the restricted (*change*) model because it allows for varying persistence of cash flow performance across different firms. Nevertheless, Ghosh (2001) argues that Healy et al. (1992)'s model is likely to be biased when industry-median performance serves as a benchmark. Measurement errors from using industry-median firms are unlikely to be random because firms tend to undertake acquisitions after a period of superior performance (Morck, Shleifer, and Vishny, 1990). A non-random measurement error will be absorbed in the intercept of the regression which, in turn, can introduce a bias. Ghosh (2001) demonstrates that if industry-median performance serves as a benchmark, both the regression-based model and the change model produce biased estimates of improvement in operating performance when the merging firms outperform the industry-median firms prior to the acquisition.⁸

To address this problem, Ghosh (2001) compares the performance of the merging firms against control firms matched on pre-merger performance and size. The matching strategy is also consistent with Barber and Lyon (1996) who argue that research designs evaluating operating performance are misspecified when sample firms perform unusually well or poorly. They show that test statistics are well specified and powerful only when performance is compared relative to control firms matched on pre-event performance and size.

⁸ The direction of the bias is unclear. It depends on pre-acquisition permanent and temporary differences between the merging firms' cash flows and the industry-median cash flow. See more details in Ghosh (2001) p.159.

By using the matched firms as a benchmark, Ghosh (2001) finds, contrary to Healy et al. (1992), that there is no evidence of improvements in post-merger operating performance. He provides results from the change model, but not those based on the regression model where operating performance persistence is allowed to vary across firms. If the bias attributed to the use of industry-median as a benchmark is the only bias, the results from either the regression-based model or the change model should be consistent after adjusting for the benchmark. Furthermore, as we explain below, both the Ghosh (2001) and the Healy et al. (1992) models are subject to bias by using the market value of assets as a deflator. As a result, it is difficult to conclude that the Ghosh (2001)'s alternative approach using the matched firm benchmark led to an unbiased conclusion.

A common approach in both Healy et al. (1992) and Gosh (2001) is to scale the cash flow performance by the market value of assets (sum of the market value of equity plus the book value of preferred stock and the book value of debt). This is also a standard approach in finance in evaluating M&A performance. One of our principal arguments is that the deflator choice is crucial when comparing the performance between post-merger and pre-merger periods.

Notice that the market value of assets is a forward-looking measure that reflects not only the returns from assets-in-place but also the returns from the assets the firm is set to acquire. In an efficient market, the present value of any expected synergistic gains from the M&A should be reflected in the combined firm's market value upon a merger (effectively through the merger premium paid to the target shareholders). As a result, cash flow performance measure scaled by the market value cannot capture the improvement in post-merger performance owing to synergy. This is because a fully (correctly) valued asset should generate only a normal return if asset values impound future gains in an unbiased manner. Only if the market's expectations are systematically biased, future rates of return are also systematically positive or negative. Stated differently, using the market value of assets as a basis for comparing pre-merger and post-merger performances is no more than a test of the market efficiency in the M&A setting (that is, whether synergistic gains are more or less than expected), rather than a test of whether the post-merger performance improves *as expected*. A simple example below illustrates this point further.

Assume that the target's net asset is \$1,000 and the acquirer's is \$2,000. The two firms' pro forma combined asset before the merger is \$3,000($=2,000 + 1,000$). Before the acquisition, the target's and the acquirer's cash flows are \$100 and \$200 per year, respectively. That is, both firms' pre-M&A returns on assets are 10% in perpetuity, as an independent or as a combined entity. The acquirer expects that the target firm's cash flows will increase to \$150, where the \$50 represents synergy. Stated differently, the target's ROA after the acquisition is 15% and the present value of *incremental* cash flows from synergy is \$500 ($=\$50/0.10$).

The M&A is structured such that the target shareholders absorb all of the benefits of the merger, such that the merger premium is \$500, or the present value of incremental cash flows of \$50 in perpetuity. When merged, the target's asset increased by 500 due to goodwill and fair value write-up under the purchase accounting method. Thus, the combined firm's asset becomes 3,500 ($=2,000+1,000+500$). Similarly, the combined firm generates \$350 of cash flows, and post-merger firm's operating performance is 10% ($=350/3,500$) under the purchase accounting. Therefore, even if the merged firm generates, as expected, higher cash flows by \$50 than the two pre-merged firms combined, the cash rate of return fails to reflect the improved operating performance. In sum, the operating performance measure scaled by the market value of assets is likely to be biased downward owing to the mark-to-market adjustment of the target firm.

However, after removing the merger premium reflected in the goodwill and asset write-up amount, the combined firm's operating performance becomes 11.7% ($=350/3,000$) which is higher than the two firms' pro forma operating performance before the merger, 10%. As a result, we point out that the post-merger operating performance is better represented by neutralizing the mark-to-market adjustment. More specifically, we use the *adjusted book value* (ABV) of assets as a deflator during the post-merger periods as described in detail in the following section.

Following Healy et al. (1992), most studies that examine the post-merger performance use market value of total assets as a deflator in measuring performance, providing the mixed results (e.g., Switzer

(1996); Harford (1999); Ghosh (2001); Linn and Switzer (2001); Ramaswamy and Waegelein (2003))⁹. Healy et al. (1992) modified the market value-based deflator by excluding the estimated announcement period abnormal market returns to both target and acquirer firms from the market value denominator in the post-merger years. The adjustment relies on the assumption that the market assesses the gains arising from the acquisition in a timely and adequate manner. Such an adjustment is also inadequate because the announcement of a corporate acquisition reveals information about not only the potential synergies in the business combination but also the acquirer's overpayment. Hietala, Kaplan, and Robinson (2002) argue that it is often impossible to isolate these effects enough to correctly interpret the market's reaction.

Similarly, Grinblatt and Titman (2002, p.708) state that the stock return at the time of the announcement cannot be attributed entirely to the expected effect of the acquisition on profitability. They argue that "the stock returns of the bidder at the time of the announcement of the bid may tell more about how the market is assessing the bidder's business than it does about the value of the acquisition." In addition, prior empirical evidence documents that investors tend to overestimate the expected gains arising from takeovers (Jensen and Ruback, 1983).

Furthermore, many studies examining long-term stock returns conclude that acquiring firms' market value declines systematically over one to five years following acquisitions (Agrawal, Jaffe, and Mandelker, 1992; Asquith, 1983; Andrade, Mitchell, and Stafford, 2001; Gregory 1997). Given the decline in the market value of acquiring firms, operating performance scaled by the market value is likely to be biased upward during the post-merger period. Taken together, results from using the market value of assets as a deflator are difficult to interpret.

Recognizing that cash flow returns scaled by the market value of assets can be biased, Ghosh (2001) use a cash flow margin, which scales cash flow by sales. The problem, however, is that this metric does not measure the overall productivity of assets in place. The productivity of assets can be decomposed into the

⁹ While Switzer (1996), Linn and Switzer (2001), and Ramaswamy and Waegelein (2003) document improved operating performance, Harford (1999) and Ghosh (2001) document significant decrease or non-increase in operating performance.

profit margin ($= \text{Cash flow}/\text{Sales}$) and the asset turnover ($= \text{Sales}/\text{Assets}$). The acquisition-induced changes in operating performance can be attributed to either the profit margin or the asset turnover, or both. For example, M&A can increase the sales rapidly at the sacrifice of profit margins but still results in an overall improvement in the asset rate of return. Then the profit margin measure alone would show a decline in performance, which can be misleading and incomplete. As a result, it is appropriate to use return on invested assets to assess the operating performance both before and after the merger.¹⁰

Based on the preceding discussion, we employ the adjusted book value (ABV) approach, which removes the purchase accounting effect from the asset base. In the ABV approach described below, we also use control firms matched by pre-merger performance and firm size as in Ghosh (2001). For comparison purposes with the prior literature, we also report results from using industry medians as a benchmark.

2.2 The ABV approach: removing the purchase accounting effect from the book value of assets

Purchase accounting requires the acquirer to allocate the purchase price first to the acquired tangible and identifiable intangible assets and then record the remainder as goodwill. Goodwill typically takes a substantial portion of the purchase price. Shalev (2009) reports that goodwill comprises about 55% of the total purchase price. In our sample, the ratio is about 54%.¹¹ The unique aspect of the purchase accounting is that it effectively requires marking the target's balance sheet to the market value of the acquisition, essentially adding the present value of future cash flows to the book value (Custodio, 2014). However, the acquirer firm's existing assets continue to be stated at historical cost, with any internally developed intangibles of the acquirer remain unrecognized.

Since the target's transaction value (i.e., the fair value of assets plus the goodwill) typically exceeds its pre-merger book value, the acquirer's post-merger book value of assets increases significantly beyond the total pre-merger book values of both the acquirer and the target. Thus, to develop comparable operating

¹⁰ Nonetheless, cash flow profit margin (on sales) can detect certain types of improvement in operating performance. In our further analysis, we also use the cash flow return on sales as a performance measure. See footnote 21 for more details.

¹¹ Panel D, Table 2 presents more details.

performance measures using adjusted book value of assets as a deflator, we undo the effect of purchase accounting. First, we exclude the goodwill from the merged firm's post-merger book value. Goodwill is obtained from purchase price allocation disclosure in the acquirer's 10-K/Q. Second, we subtract the fair value write-up from the post-merger book value of assets. Although the purchase price, the goodwill, and the fair value of the acquired tangible and intangible assets are typically disclosed in the purchase price allocation disclosure, the fair value write-up is not directly available. As shown in Appendix 1, the purchase price is presented by the sum of the target's net identifiable assets, fair value write-up, and goodwill. Net identifiable assets of the target is defined as total assets (Compustat item ATQ) – target firm's existing goodwill (GDWLQ), if any, - total liabilities (LTQ), where the variables are from Compustat Quarterly file, by identifying the target firm's the last quarter before the acquisition. Thus, we infer the fair value write-up amount by subtracting goodwill and net identifiable assets of the target from the purchase price.

2.3. Operating Cash flow measurement

Following Healy et al. (1992) and Ghosh (2001), we focus on cash flow performance which is considered to be superior to other measures (e.g., earnings) after significant events such as takeovers (Barber and Lyon, 1996). Cash flow performance measures have several advantages over earnings-based measures. First, cash-based measures mitigate potential earnings manipulation issues associated with accrual-based earnings measures. Erickson and Wang (1999) suggest that it is more difficult to detect earnings management during a business combination, given the structural change in the combined entity's earnings. Second, upon the acquisition, the target firm's tangible assets are written-up to the fair value at the acquisition date, and its previously unrecognized intangible assets are recognized in the combined firm's balance sheet. Since the asset write-up value is systematically charged to earnings via depreciation and amortization expense in the post-merger periods, the post-merger earnings will be systematically lower relative to the pre-merger earnings.

We employ two cash flow measures. The first is pretax operating cash flow as defined and used in Healy et al. (1992) and Ghosh (2001). In particular, both studies define pretax operating cash flow as net

sales minus cost of goods sold minus selling and administrative expenses, plus depreciation and amortization expenses. Because they do not specify which Compustat items are used for the pretax operating cash flow, we use Compustat's OIBDP as a measure of pretax operating cash flow (hereafter designated OCF1), defined as Net sales (Compustat item SALE) – Cost of goods sold (Compustat item COGS) - Selling, General and Administrative Expenses (Compustat item XSGA).¹²

The pretax operating cash flow (OCF1) is, strictly speaking, not a cash flow measure but an accrual-based measure equivalent to so-called EBITDA. As a result, we also use cash flow from operations as reported on the Statement of Cash Flow (Compustat item OANCF) as a second measure of cash flow performance (hereafter OCF2).

3. Hypotheses and Research Design

3.1 Hypotheses

Based on the previous discussion, we test two hypotheses. The first hypothesis comes directly from Healy et al. (1992) and Ghosh (2001) asking whether corporate performance improves after a merger.

Hypothesis 1: There is no improvement in the operating performance of a merged firm during the post-merger period, compared with the pre-merger period.

Neoclassical theories predict, in general, that firms pursue acquisitions to make the best use of their scarce assets. As a result, better-performing firms and firms with better growth opportunities create value through acquisitions (Arikan and Stulz, 2016). To the extent that they acquire target's assets that they can make better use in the combination of their existing assets, we can expect an improvement in post-merger operating performance. Also, under the perspective that corporate acquisitions are a mechanism to achieve synergies between the two combining firms, the acquisition may discipline and monitor the management teams and replace them when necessary (Jensen, 1986; Shleifer and Vishny, 1988). According to Jensen (1986), M&As eliminate managerial inefficiencies that result from retaining free cash flows not distributed

¹² Based on Compustat's Balancing Model, Cost of goods sold (Compustat item COGS) does not include depreciation and amortization expense. Thus, OIBDP is equivalent to the pre-tax cash flow measure in Healy et al. (1992) and Ghosh (2001).

to owners. This disciplining (efficiency) hypothesis also predicts that post-merger operating performance improves, compared to pre-merger period.

On the other hand, corporate acquisitions can be driven irrationally by agency problems or the acquiring firm manager's behavioral bias. Agency theories predict that firms make wealth-destroying acquisitions as they become mature because their cash flow exceeds their internal growth opportunities and management becomes more entrenched so that it pursues growth at the expense of shareholders (e.g., Mueller 1972; Jensen 1986, 1993). The agency-based theories also predict that corporate acquisitions can be motivated by excess cash flow, managerial hubris, and empire-building motives of the acquiring firm and its manager. From such a perspective, a corporate acquisition may not create synergetic gains in the form of higher operating cash flows. In summary, rejecting the null hypothesis is consistent with a characterization that corporate acquisitions create synergistic (economic) gains, whereas a failure to reject is consistent with a characterization that mergers, in general, fail to provide real economic gains.

The second hypothesis addresses another unanswered question of whether the operating performance improvement, if any, is associated with the goodwill or the merger premium.

Hypothesis 2: There is no association between the operating performance improvement and the recognized goodwill or the equity premium.

According to the purchase accounting method, the acquirer determines the fair value of the target's net assets in reference to the market transaction prices for similar assets or liabilities at or near the measurement date. Otherwise, the fair value is estimated using other valuation techniques. Upon the acquisition, the acquirer adds the fair value of the target's net assets to the acquirer's balance sheet. From an accounting standpoint, any acquisition price paid in excess of the fair market value is recorded as goodwill on the acquirer's balance sheet.¹³

¹³ Notice that the fair-value write-up includes identifiable intangible assets which must be amortized, whereas the goodwill portion is not depreciated.

Different perspectives exist on whether the purchased goodwill is associated with operating performance improvement. On the one hand, FASB (2010) argues that the purchased goodwill represents an economic resource capable of producing cash inflows. Also, the purchased goodwill usually represents rents expected by the acquirer (Ramanna, 2008). Thus, to the extent that the purchased goodwill reflects the expected synergy among the acquired assets and the existing assets that jointly work for the future economic benefit, and managers choose the target as a positive net present value investment, there is a positive association between the purchased goodwill and the post-merger abnormal operating performance.

On the other hand, the existing literature questions whether the purchased goodwill is a real asset. A body of research provides evidence that goodwill merely reflects overpayment and is used as a catch-all item to justify manager's profit-destroying actions (e.g., Ramanna and Watts, 2012; Li and Sloan, 2017; Gu and Lev, 2011; Li Shroff, Venkataraman, and Zhang, 2011). Thus, to the extent that goodwill comprises mostly the acquisition overpayment, the association between the purchased goodwill and post-merger operating performance is trivial.

From the equity market point of view, the acquisition premium can be defined differently. The difference between the offer price and the target's stock price before the acquisition is considered, in general, as the acquisition premium and frequently used in Finance literature (e.g., Datta, Iskandar-Datta, and Raman, 2001; Dong, Hirshleifer, Richardson, and Teoh, 2006; Lin, Officer, and Zou, 2011; Wang and Xie, 2009). This equity premium based on the stock market value is different from the purchased goodwill because the target's pre-merger stock price is typically unequal to the book value of equity per share or fair value of net assets per share. While purchased goodwill captures the acquisition premium over the fair value of the target's net assets, the equity premium captures the acquisition premium over the market value of the target's equity. The conceptual framework of the acquisition premium from the two different perspectives is depicted in Appendix 2. To the extent that both metrics capture the expected synergy resulting from the business combination, the two metrics are associated with the improvement in post-merger operating performance in the same direction.

3.2 Difference-in-Difference and Control Group Estimation Approach

Conventional methodologies use either a cross-sectional regression of post-merger performance on pre-merger performance (Healy et al., 1992) or a cross-sectional comparison of the change in performance (Ghosh, 2001). Such approaches have potential limitations. First, firm-specific differences are not adequately controlled for, and such differences can lead to self-selection (Ghosh, 2001) or correlated omitted variables problems. Second, the estimates can be affected by economy-wide intertemporal shifts in operating performance. For these reasons, we adopt the difference-in-difference (DID) estimation approach and also use a control group of firms matched by pre-merger performance. Following Barber and Lyon (1996) and Ghosh (2001), we find a control group of firms matched by pre-merger performance and size for each pair of the target and acquiring firms.

More specifically, the control firms are pairs of firms matched with the target and the acquirer based on the matching procedure outlined in Loughran and Ritter (1997) and Ghosh (2001). For every unique acquisition, we find a matched firm belonging to the same 2-digit SIC industry of each of the acquiring and the target firm one year prior to the acquisition from Compustat. All firms from the same industries as the acquiring and target firms with total assets between 25% and 200% are ranked by their operating cash flow performance. Firm pairs that have cash flow performance closest to those of the acquiring and target firms are selected as a pair of matching control firms. The pro-forma data for the control firms are created by summing up the data of the two matched firms, as in the case of the merged firms during the pre-merger period. The combined entity for the merged firms is considered as the treatment group, while the combined entity of the matched firms is designated as the control group. We then estimate the following DID specification to test Hypothesis 1.

$$\begin{aligned}
& Performance_{i,t} \\
&= \alpha_0 + \alpha_1 Post + \alpha_2 Post * Treat + \alpha_3 Size + \alpha_4 Leverage + \alpha_5 MTB \\
&+ \alpha_6 Performance_{i,t-1} + Firm\ fixed\ effect + Year\ fixed\ effect \\
&+ \varepsilon,
\end{aligned} \tag{3}$$

where *Post* is an indicator variable set to 1 during the post-merger period, 0 otherwise; *Treat* equals to 1 if it is a treatment (merged) firm and 0 for a control firm (i.e., a non-merged firm).

The dependent variable, $Performance_{i,t}$, is the ratio of operating cash flows to the beginning book value of assets for firm *i*, year *t*. For each of the pre-merger periods (years -5 to -1), we sum up the operating cash flows of the target and the acquirer to construct the pro forma cash flows for a hypothetically combined firm in each of the five years before the acquisition. Similarly, we add up the book values of assets of the target and the acquirer to construct the pro forma book value of assets for the combined firms in each of the five years before the merger. We scale the combined operating cash flows by the combined book value of assets, to estimate operating cash flow $Performance_{i,t}$, during the pre-merger periods.

For the post-merger periods (year 1 to 5), operating cash flows are the actual reported values of the merged firm. As discussed in section 2.1, however, deflating cash flows by the reported book value of assets during the post-merger period can cause a bias in comparing pre- versus post-merger operating performances. Thus, we use the adjusted book value (ABV) which deducts goodwill and fair value assets write-up from the reported book value of assets. Notice that we do not use the observations for the year of merger (year 0).

The DID design permits the inclusion of time-varying firm characteristics. Thus, we include combined-firm level control variables such as firm size (*Size*), leverage (*Leverage*), and the market-to-book ratio (*MTB*), following prior research (Wang and Xie, 2009; Lin et al., 2011). The combined firm-level data for the treatment group (for the control group) is the aggregation of the acquirer (the acquirer-matched firm) and the target (the target-matched firm) data. *Size* is the natural log of total assets (Compustat item AT) of the combined firm. *Leverage* is the beginning total assets (AT) of the combined-firm divided by the beginning total liabilities (Compustat LT) of the combined-firm. *MTB* is the market value of assets at the combined-firm level divided by the book value of assets (AT) at the combined-firm level, where the market value of the asset is the sum of the market value of equity (Compustat

CSHO*PRCC_F) plus book value of assets minus book value of equity (CEQ). We also include a one-year lag of *Performance* to control for possible persistence in operating cash flows (Healy et al. 1992).

The coefficient α_2 on *Post * Treat* calibrates the effect of the corporate acquisition on the merged firm's post-merger operating performance. Specifically, α_2 captures the change in operating performance of the merged firms beyond the contemporaneous change in operating performance of the non-merged firms. Thus, a positive estimate α_2 indicates the merged firms' operating performance improvement due to corporate acquisition.

All regressions include firm and year fixed effects. Firm fixed effects control for time-invariant omitted firm characteristics and ensure that the estimate of α_2 reflects the actual changes in the treatment firms' performance. Year fixed effects account for changes in economy-wide common factors, such as macroeconomic conditions, and time-specific factors, the impact of the business cycle, that could affect firm operating performance. The estimated robust standard errors are clustered at the combined firm level to correct for possible serial correlation and heteroscedasticity.

To test Hypothesis 2 addressing whether the acquisition premium is associated with real economic gains during the post-merger period, we interact the acquisition premium with the DID coefficient from Eq. (3) as follows:

$$\begin{aligned}
& Performance_{i,t} \\
&= \beta_0 + \beta_1 Post + \beta_2 Post * Treat + \beta_3 Post * Treat * Premium + \beta_4 Size \\
&+ \beta_5 Leverage + \beta_6 MTB + \beta_7 Performance_{i,t-1} + Firm\ fixed\ effect \\
&+ Year\ fixed\ effect + \varepsilon,
\end{aligned} \tag{4}$$

where *Premium* is the acquisition premium measured by either the accounting premium (*GW*) or the equity premium (*EP*). *GW* is a deal-specific acquisition premium measured by the purchased goodwill scaled by the acquirer's book value of assets one year prior to the acquisition. The purchased goodwill is taken from the purchase price allocation disclosure in the acquirer's 10-K/Q. *EP* is the equity premium per share times the number of target common shares outstanding excluding treasury shares, from the most

recent balance sheet available prior to the merger announcement (COMDFIN, SDC item). The equity premium per share is calculated as the difference between the offer price (HOSPR, SDC item) and the target's stock price four weeks prior to the merger announcement date (HOSTC4WK, SDC item).¹⁴ To be consistent with *GW*, we construct *EP* in million dollars, scaled by the acquirer's book value of assets one year prior to the acquisition. All other variables are identical as defined in Eq. (3) and all control variables in Eq. (3) also appear in Eq. (4).

In this specification, the coefficient β_3 on *Post * Treat * Premium (GW or EP)* is of particular interest. A positive estimate suggests that the acquisition premium is justified to create post-merger abnormal operating performance, compared to the operating performance of non-merging firms. We include firm and year fixed effects and cluster robust standard errors at the acquirer firm.

As explained in the following section, both specifications are estimated using a panel data of 2,960 firm-year treatment and control group observations from 148 acquisitions over a ten window (i.e., five years of pre-merger, year -5 to year-1, and five years of post-merger year 1 to year 5). The year of acquisition, year 0, is excluded from the analysis for the following reasons. First, under the purchase accounting, on the year of the merger completion (i.e., year 0), the target and acquirer are consolidated for financial reporting purposes only from the date of the merger. Thus, operating results for the year 0 are not comparable across firms and over the years. Second, cash flow performance in year 0 can be affected by one-time merger-related costs incurred during the year. It makes difficult to compare the performance in year 0 to that in other years.

4. Sample

In the U.S., purchase accounting is the only permissible M&A accounting method since July 1, 2001 (SFAS 141, 142). Until then, an alternative was the pooling-of-interests accounting method, in which the balance sheets of the two companies are added together without creating goodwill. Since SFAS 142

¹⁴ We also use the target's stock price one week before the merger announcement date (HOSTC4WK, SDC item) and the target's stock price one day before the merger announcement date (HOSTC1DAY, SDC item). The result holds all cases consistently.

became effective, acquiring firms are required to disclose how they allocate the purchase price to the balance sheet. This study requires information about the purchase price, the deal-specific goodwill amount, and the extent of the revaluation of the assets toward the fair values. Thus, the sample period begins in July 2001 and ends in 2016. Since we require five years of pre- and post-merger financial performance data excluding the merger execution (completion) year, the sample merger execution date ends in 2011.

Table 1 outlines the sample composition. Following the Ghosh (2001) approach, we identify 1,100 acquisitions by selecting the largest one hundred acquisitions in the U.S. between two domestic companies between 2001 and 2011. We require that 1) both the acquirer and the target are publicly traded, and 2) the acquirer purchases 100% of the target's equity as reported by Thompson Financial Securities Data Company (SDC) database. We remove 50 acquisitions that were completed before July 1, 2001, because these deals are not governed by SFAS 142. Next, we exclude 437 deals in which the acquirer is engaged in another acquisition(s) of 100% equity purchase within the pre- and post-merger period. This exclusion mitigates the confounding effects of multiple acquisitions impacting the post-merger operating performance.

Gosh (2001)'s sample spans 15 years during 1981 and 1995 and 315 acquisitions but does not address the potential confounding effect arising from the acquirers' multiple large size acquisitions during the post-merger period. Healy et al. (1992) assume that the confounding effect from multiple acquisitions is likely trivial because they examine the largest 50 deals during the period January 1979 to June 1984. Contrary to their assumption, large size acquirers often make multiple large acquisitions.¹⁵

We further remove 159 acquisitions for which requisite data are unavailable in Compustat and CRSP for either the acquirer or the target. We also exclude 117 acquisitions that involve banks and utility companies because these firms are subject to special accounting treatment and regulations, making them difficult to compare with other firms. For 137 acquisitions, cash flow performance measures are missing for either the target or the acquirer firms. Lastly, we remove 52 acquisitions for which the purchase price

¹⁵ In our initial sample, 42% of acquirers have multiple large size acquisitions (i.e., as large as listed on the largest one hundred U.S. domestic acquisitions of the year between 2001 and 2011). The average number of multiple acquisitions is 2.8 among the acquirers.

allocation data are unavailable from the 10-K/Q files in SEC's EDGAR database. The final sample consists of 148 pairs of acquiring and target firms.

Table 2 presents the summary statistics of the sample acquisitions. The information about the acquisition completion year (Panel A), payment methods (Panel B), and equity premium (Panel D and E) are from the SDC database. We hand-collect the purchase price allocation data from the merged firms' 10-K/Q filings in the SEC's EDGAR database (Panel D).

The sample distribution in Panel A shows that the acquisitions are evenly distributed over the 11 years of the sample period based on the acquisition completion. Panel B which displays the payment methods indicates that 37.8% of the acquisitions are cash-only deals, whereas 12.8% are stock-only deals. The remaining 49.4% involve both cash and stocks.¹⁶ Following Maqueieira et al. (1998) and Ghosh (2001), we use Compustat's two-digit SIC code to identify whether merging firms are between related or unrelated industries. Panel C reports that 69.5% of the acquisitions are within the related industries. In addition, the SDC database classifies that 95% of the acquisitions are friendly. Panel D tabulates purchase price allocation, which presents a mean of \$3,317 million and a median of \$1,246 million of the total purchase price. Goodwill takes up the most substantial portion of the purchase price, \$1,798 million on average and \$672 million at the median, and comprises 54% of the total purchase price. Shalev (2009) extensively hand-collects 1,019 samples of the purchase price allocation disclosure and reports that goodwill takes about 55.4% of the total purchase price, which is very similar to the ratio of 54% from our sample. The fair value of intangible assets is also substantial, at \$938 million on average and \$165 million at the median.

Fair value write-up amounts, calculated as described in Section 2.3, are reported in Panel D. The mean of \$806 million and the median of \$139 million indicate that the asset write-up increases the merged firms' book value of assets significantly in the post-merger period. This magnitude indicates the importance

¹⁶ The medium of payment, whether the target shareholders were paid with cash or stocks, does not change the fact that the target's assets are marked-to-market. A stock deal can be considered as issuing stocks to obtain cash, which, in turn, is given to the selling stockholders. Therefore, there is no substantive difference between cash deals and stock deals in comparing pre- vs. post-merger operating performance.

of subtracting the fair value write-up in addition to the subtracting goodwill from the merged firm's book value of assets when undoing the purchase accounting effect on the book value of assets in the post-merger period.

In addition, the equity premium is calculated as specified in Section 3.2 and Appendix 2 and reported in Panel D. The mean of \$658 million and the median of \$212 million show that the acquisition premium measured in terms of the payment over the market value of the target's stock price is also substantial. The correlation table in Panel E indicates that the two measures of the acquisition premium (i.e., purchased goodwill and equity premium) are highly correlated with the Pearson correlation of 0.79.

5. Results

5.1 Main Results

Columns 1 and 2 of Table 3 present estimates for Eq. (3) addressing the first hypothesis of whether corporate acquisitions create a real economic gain in the form of improved post-merger cash flow performance. Columns 3 to 6 of Table 3 show estimates for Eq. (4) addressing the second hypothesis of whether the purchased goodwill or the equity premium is associated directly with the improvement in operating performance. Recall that we use two “cash flow” measures following extant research, namely, OCF1 (operating income) and OCF2 (operating cash flow).

The primary variable of interest is the interaction term, $Post * Treat$, which captures the acquisition-induced changes in operating performance of the merged firm in excess of the contemporaneous change in operating performance of non-merged firms. The estimate on $Post * Treat$ (0.034, t-statistic=2.98) in Column (1) indicates a significant improvement in the post-merger operating performance of the merged entities compared to the non-merged ones. It suggests that corporate acquisitions create economic gains in the form of improved cash flow returns. The result from using the cash flow measure of OCF2 in Column (2) is consistent with that using OCF1 (Column 1), as indicated by a significantly positive estimate on $Post * Treat$ (0.024, t-statistic=2.31).¹⁷

¹⁷ To mitigate a concern that the result are driven by a different sample period, we divide the sample into two periods such that pre-2008 and post-2008 period, and test the two sub-samples separately. The results hold consistently over the two different periods for the two different cash flow measures (i.e., OCF1 and OCF2).

The positive effect of the corporate acquisition on operating performance appears to be economically important. Focusing on Column (1) using OCF1, being in the treatment group is associated with a 3.4 percent increase in return on assets. Relative to median ROA (=14.7%), the 3.4 percent increase represents a 23.1% increase in *Performance*. Similarly, in Column (2) using OCF2, being in the treatment group is associated with a 2.4 percent increase in ROA, which represents a 22.2% increase in *Performance* from the median.¹⁸

Turning to the relation between the acquisition premium and the post-merger operating performance, Columns (3) and (4) in Table 3 present estimates for Eq. (4) using the cash flow measure of OCF1 and OCF2, respectively, and correlating with the purchased goodwill (*GW*) as the acquisition premium. We focus on the interaction term, $Post * Treat * GW$, which measures the incremental impact of the purchased goodwill on the post-merger abnormal cash flow performance. For both cash flow measures of OCF1 and OCF2, the estimate for $Post * Treat * GW$ is positive and significant, indicating that for merged firms, a higher level of purchased goodwill is associated with a better post-merger operating performance. The purchased goodwill is typically determined during the acquisition process and disclosed long before the merged firm starts to create the operational synergies in the form of cash flow.¹⁹ Thus, this result implies that not only the purchased goodwill is justified to be recognized as an asset used to create real economic gains, but also it may predict the merged firm's post-merger abnormal cash flow performance. Observe also that the $Post * Treat$ indicator variable is no longer significant when we consider the size of the goodwill that is found to be proportional to future benefits.

Using the equity premium (*EP*), Column (5) and (6) in Table 3 present the estimates for Eq. (4) using cash flow measures of OCF1 and OCF2, respectively. Consistent with the results for the goodwill (*GW*), the interaction term $Post * Treat * EP$ is significantly positive for both cash flow measures of

¹⁸ We provide the estimate of economic significance in order to intuitively interpret the magnitude of the effect of being in the treatment group on operating performance. The true size of the effect on any given firm is affected by numerous factors and circumstances surrounding the firm beyond the scope of this analysis. Thus, this effect is for the "median firm, all else equal."

¹⁹ The purchase price allocation information that firms disclose on business combinations in the 10-K files is provided a few months after the actual acquisition is completed. (Shalev, 2009)

OCF1 and OCF2. It suggests that the acquirers who pay higher equity premium over the target's stock market price also realize significantly higher post-merger operating performance. Further, it implies that the equity premium, along with the purchased goodwill, is also indicative of the post-merger abnormal operating performance.

Overall, the consistent findings over the two different definitions of the acquisition premium and the two different cash flow measures suggest a positive relation between the acquisition premium and the realized synergies (i.e., post-merger abnormal operating performance). Such findings alleviate the concern that the acquisition premium mainly captures overpayment rather than economic gains and shed lights on the question of whether goodwill is a productive asset worthy of balance sheet recognition.²⁰

5.2 Results using Conventional Performance Measures and Approaches

It is of interest whether our results are different from those of the existing studies because of adopting the adjusted book value approach or because of using the DID approach. We address this question in two ways. First, we estimate the DID model Eq. (3) using the conventional performance measure employed by Healy et al. (1992) and Ghosh (2001) who use the market value of assets as a deflator. Table 4 report the results. All variables are defined the same way as in Eq. (3), except that the cash flow performance measure (the dependent variable) is deflated by the market value assets rather than the adjusted book value (ABV) of assets. Following Healy et al. (1992), the market value of assets is the sum of the market value of equity (Compustat CSHO*PRCC_F) plus the book value of preferred stock (PSTK) and the book value of debt (DLC + DLTT). The market value of assets is recalculated at the beginning of each year to control for changes in the size of the firm over the years. Also, to be consistent with Healy et al. (1992) and Ghosh (2001), we exclude the estimated announcement period abnormal market returns of the target and acquiring firms from the market value assets in the post-merger years. The abnormal market

²⁰ Empirically, it is difficult to measure the expected-synergies component and thus the true over- or under-payment (Malmendier, Moretti, and Peters, 2018).

returns are measured from five days before the merger announcement to the date the target is delisted from trading on the public exchange.

Columns (1) and (2) in Table 4 present the estimates for Eq. (3) with the cash flow measure of OCF1 and OCF2, respectively. The estimate for $Post * Treat$ in both Column (1) and Column (2) is not statistically significant, which is in contrast to the estimates in Column (1) and (2) in Table 3.²¹ The conflicting results indicate that when operating performance is deflated by market value of assets, the cash flow performance does not capture any abnormal post-merger performance, which is consistent with our discussion in Section 2.1.

Second, using the ABV method, we investigate whether we obtain consistent evidence of an increase in post-merger operating performance when we use the methodologies of Healy et al. (1992) and Ghosh (2001). To be consistent with prior studies, we use the same definition of cash flow measure, OCF1, and follow the same procedure in adjusting for the industry-median benchmark and the performance-matched firm benchmark as specified in Healy et al. (1992) and Ghosh (2001), respectively. We also report results using a different definition of cash flow measure, OCF2 (cash flow from operations).

Table 5 presents cash flow performance relative to industry median firms. Panel A reports the means and medians of the raw performance measures before and after the merger, whereas Panel B tests whether such measures are different between the pre- and post- merger periods, using the conventional approach.

Panel B shows the results from the cross-sectional approach of Healy et al. (1992) who regress median post-merger period cash flow returns on median pre-merger period cash flow returns (Eq. 1). Recall in Eq. (1) that Healy et al. (1992) calculate industry-adjusted performance measures by subtracting the industry median cash flow rate of return from the sample firm value for each year and firm. Following Healy et al. (1992), we designate $IACR_{post,i}$ as the median of the five industry-adjusted cash flow returns during the 5-year post acquisition period. Similarly, $IACR_{pre,i}$ is the median of the industry-adjusted cash

²¹ In another analysis, we re-estimate Eq. (3) using cash flows deflated by sales. We find a modestly significant (at the 10% level) estimate on $Post*Treat$ only for OCF1 deflated by sales.

flow return on assets during the 5-year pre-merger period. We then regress $IACR_{post,i}$ on $IACR_{pre,i}$. Notice that according to Healy et al. (1992), the intercept is an estimate of the average improvement in performance.

In Column (1), the estimate on the *Intercept* variable is positive and significant (0.088, t-value=3.77). It indicates that cash flows of the merged firms increase significantly by 8.8% (every year) after controlling for the changes in industry cash flow and cash flow persistence. The result also shows that the magnitude of the improvement (8.8%) is substantially higher than the magnitude of 2.8% reported by Healy et al. (1992). Based on the second definition of cash flow measure (OCF2), the estimate on the *Intercept*, (0.056, t-value=3.49), is also statistically significant in Column (2), suggesting that the cash flow rate of return increases by 5.6% in the post-merger period.

Panel C of Table 5 displays the results using Ghosh (2001)'s change model methodology. Unlike Healy et al. (1992), Ghosh (2001) benchmarks the combined firms' performance measures against that of a firm matched by industry, performance, and size. He then evaluates the *change* in cash flow performance which is defined as $\Delta MACR = MACR_{post,i,median} - MACR_{pre,i,t-1}$, where $MACR_{post,i,median}$ is the median of cash flow return of firm i during the post-merger period (of three years) less the median cash flow return of the matched firm. Similarly, $MACR_{pre,i,t-1}$ the cash flow return of firm i less cash flow return of the matched firm one year prior to the merger.

Recall that Ghosh (2001) does not find significant changes from this change model, concluding that Healy et al. (1992)'s finding of improvement in post-merger performance is biased due to the use of industry-median as a benchmark. In contrast, our results in Panel C show that the median increase in the relative cash flow ($\Delta IACR$) is 4.7%, which is statistically significant the 5% level. The result based on OCF2 measure also indicates 3.4% of the increase in post-merger cash flow at 1% significance level.

In sum, using the book value of assets adjusted for the purchase accounting effect as a deflator of cash flow performance, we provide consistent evidence of improved post-merger cash flow performance. The results are robust for all combinations of conventional methodologies (i.e., either the regression model

or the change model) and the benchmark choice (i.e., either industry-median or pre-merger performance matched firms). As a result, the evidence is persuasive that the mixed results from prior studies can be ascribed to the use of the market value of assets as a deflator of cash flows.

6. Additional Analyses

6.1 Assessing parallel-trends assumption

The central assumption underlying the difference-in-difference strategy is that the treatment and control groups have parallel trends in performance. To assess the validity of the parallel trend assumption, we examine the difference in pre-merger trend in the outcome variables across the treatment and the control firms, by mapping out counterfactual treatment effects over the sample period. In particular, we replace *Post* and *Post*Treat* from Eq. (3) with an indicator variable for each pre-merger period and each period interacted with *Treat*. We exclude the indicator for year t-1 before the acquisition and as such year t-1 serves as the benchmark for the remaining effects. Figure 1 depicts the counterfactual treatment effect on yearly basis relative to the acquisition. If the parallel trend assumption is valid, then the treatment effect should be close to zero in the pre-merger period, but non-zero in the post-merger period (See Christensen, Floyd, Liu, and Maffett, 2017). For both OCF1 and OCF2 cash flow measures, the counterfactual treatment effects in the pre-merger periods are small and statistically indistinguishable from zero, which provides support for the parallel-trend assumption. The results also suggest that the treatment effect takes place following the acquisition.

6.2 Standardized Premium and Explanatory Power

One question is whether goodwill or equity premium better reflects the incremental increase in future operating performance. To facilitate the comparison of the explanatory power between *GW* vis-à-vis *EP*, we standardize both variables: that is, we transform each variable so that the mean is zero and the standard deviation is one. Untabulated results for estimating Eq. (4) yield similar conclusions as in Table

3.²² The adjusted- R^2 of the model using *GW* is nominally higher than that one using *EP* (0.359 vs. 0.326, for OCF1; 0.270 vs. 0.244 for OCF2). As a formal test, we perform Vuong's (1989) likelihood ratio test to compare the relative explanatory power (adjusted- R^2 values) between *GW* and *EP*. Vuong's Z-statistics yield insignificant test statistics of 0.77 and 0.68, respectively, for the two different cash flow measures OCF1 and OCF2.

We also estimate Eq. (4) by including both *Post*Treat*GW* and *Post*Treat*EP* as explanatory variables. Owing to the high correlation between the *GW* and *EP* (0.79), the model produces low significance levels for both variables. For both OCF1 and OCF2, the estimate on *Post*Treat*EP* is no different from zero, whereas the estimate on *Post*Treat*GW* is significant at the ten percent level only for OCF1 (untabulated). Overall, such results indicate that neither *EP* nor *GW* dominates the other as a proxy for future improvement in operating performance.

7. Conclusion

This study addresses two fundamental and long-standing questions related to post-merger operating performance of the merged firms, using a sample of 148 large U.S. corporate acquisitions completed in the period between mid-2001 to 2011. First, does corporate acquisitions create real economic gains in the form of improved cash flow operating performance? Results from the existing studies have been mixed and inconclusive. We show that the unresolved question is primarily due to the bias arising from the use of the market value of assets as a deflator. We note that under the currently mandated M&A accounting approach, the target's assets are marked-to-market, whereas the parent company's assets are still stated at historical cost. Such a disparity engenders inconsistencies in measuring the rates of return between pre- and post-acquisition periods, as well as between firms with and without M&A transactions. We propose to use the adjusted book value of assets as a deflator to disentangle the purchase accounting effect and to construct a comparable and consistent performance measure. Using the adjusted book value of assets as a deflator and the difference-in-difference approach, we document a significant improvement in post-merger cash flow

²² The results, which are not tabulated for brevity are available upon request.

performance of the merged firms compared to the non-merged firms. The results indicate that the corporate acquisitions create economic synergies evidenced by the improved cash flow performance in the post-merger period. Whether or not which party, selling shareholders or the acquiring firm, reap the synergistic benefits, is a different question.

Second, we examine whether the acquisition premium, measured by either the purchased goodwill or the equity premium, is justified, as it correlates with real economic gains in post-merger periods. In particular, we document a significant association between the acquisition premium and the post-merger abnormal operating performance of the merged firms. In summary, our study provides an answer to the question of whether goodwill is a productive asset that deserves to be recognized in the balance sheet.

Furthermore, our analysis is relevant to studies that use accounting or cash flow rates of returns, such as ROA, ROE, Tobin's q , and book-to-market ratio. We suggest that researchers need to develop an approach to address the inconsistency that an M&A creates a balance sheet in which some parts of the firm's assets are stated at the historical cost whereas other parts (the acquired firms) are marked-to-market. Such an inconsistency can be small under normal circumstances but can be substantial when firms execute multiple takeovers or a large M&A transaction.

Finally, although we show that the acquisition premium is associated with the improvement in post-merger operating performance, we cannot ascertain that the premium is equal to the present value of the expected synergies created by the acquisition, dollar for dollar. Such an analysis requires numerous assumptions about discount rate and expected cash flows, a process which involves significant measurement errors.

Reference

- Agrawal, Anup, Jeffrey F. Jaffe, and Gershon N. Mandelker. "The post-merger performance of acquiring firms: a re-examination of an anomaly." *The Journal of Finance* 47.4 (1992): 1605-1621.
- Andrade, Gregor, Mark Mitchell, and Erik Stafford. "New evidence and perspectives on mergers." *Journal of economic perspectives* 15.2 (2001): 103-120.
- Arikan, Asli M., and René M. Stulz. "Corporate acquisitions, diversification, and the firm's life cycle." *The Journal of Finance* 71.1 (2016): 139-194.
- Asquith, Paul. "Merger bids, uncertainty, and stockholder returns." *Journal of Financial Economics* 11.1-4 (1983): 51-83.
- Atwater, Peter. "The Microsoft-LinkedIn Deal Proves We overvalue Goodwill" *Time.com* (2016) (<http://time.com/4376607/microsoft-linkedin-goodwill>)
- Barber, Brad M., and John D. Lyon. "Detecting abnormal operating performance: The empirical power and specification of test statistics." *Journal of Financial Economics* 41.3 (1996): 359-399.
- Boubakri, N. and Cosset, J. The financial and operating performance of newly privatized firms: evidence from developing countries. *Journal of Finance* 53 (1998): 1081–1110.
- Cai, Ye, Yongtae Kim, Jong Chool Park, and Hal D. White. "Common auditors in M&A transactions." *Journal of Accounting and Economics* 61, no. 1 (2016): 77-99.
- Chen, Xia, Jarrad Harford, and Kai Li. "Monitoring: Which institutions matter?." *Journal of Financial Economics* 86.2 (2007): 279-305.
- Christensen, Hans B., Eric Floyd, Lisa Yao Liu, and Mark Maffett. "The real effects of mandated information on social responsibility in financial reports: Evidence from mine-safety records." *Journal of Accounting and Economics* 64, no. 2-3 (2017): 284-304.
- Custodio, Claudia. "Mergers and acquisitions accounting and the diversification discount." *The Journal of Finance* 69.1 (2014): 219-240.
- Datta, Sudip, Mai Iskandar-Datta, and Kartik Raman. "Executive compensation and corporate acquisition decisions." *The Journal of Finance* 56.6 (2001): 2299-2336.
- Dong, M., Hirshleifer, D., Richardson, S., & Teoh, S. H. (2006). Does investor misvaluation drive the takeover market?. *The Journal of Finance*, 61(2), 725-762.
- Erickson, Merle, and Shiing-wu Wang. "Earnings management by acquiring firms in stock for stock mergers." *Journal of Accounting and Economics* 27.2 (1999): 149-176.
- FASB Statement of Financial Accounting Standards No. 142. (2001) (<https://www.fasb.org/resources/ccurl/731/820/fas142.pdf>)
- FASB Conceptual Framework - Elements and Recognition. Financial Accounting Standards Board (2010).
- Fu, Fangjian, Leming Lin, and Micah S. Officer. "Acquisitions driven by stock overvaluation: Are they good deals?." *Journal of Financial Economics* 109.1 (2013): 24-39.

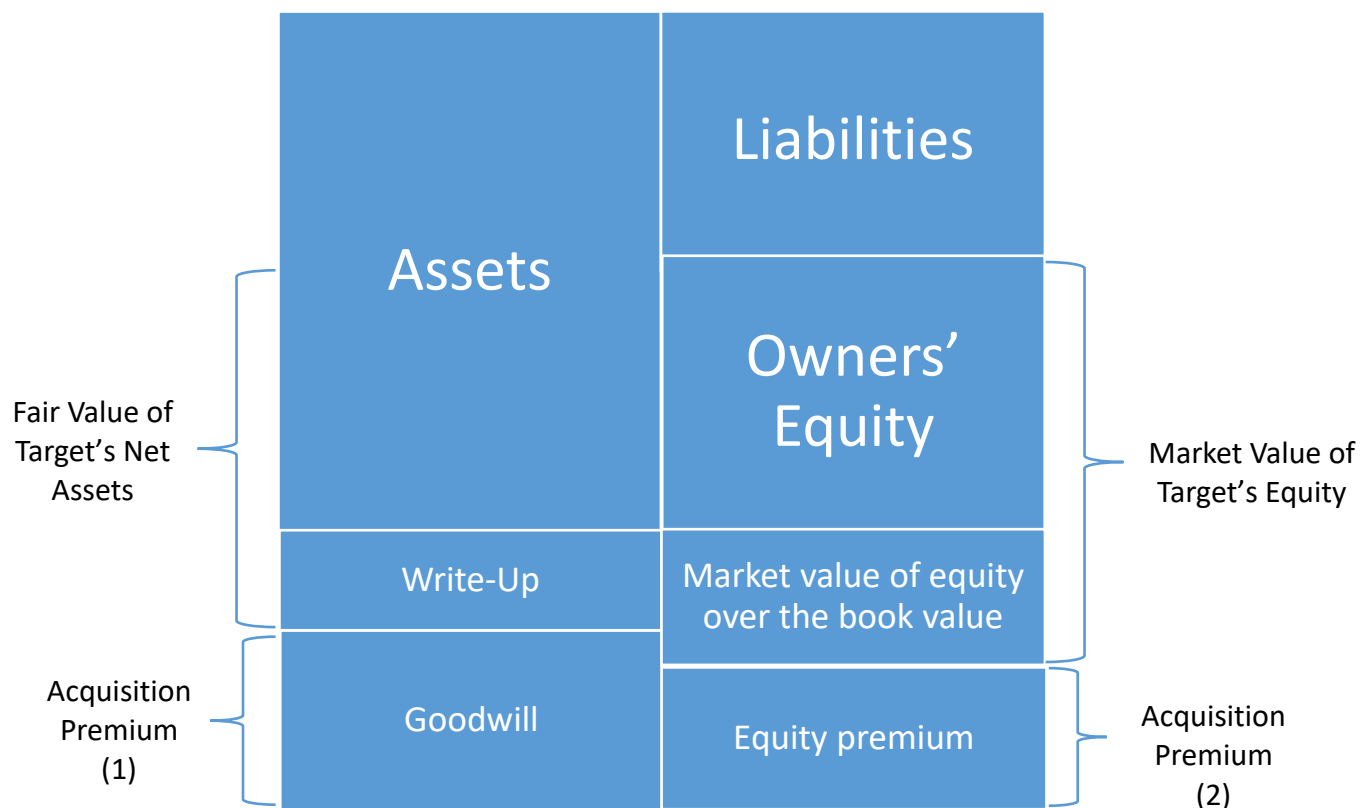
- Ghosh, Alok. "Does operating performance really improve following corporate acquisitions?." *Journal of corporate finance* 7.2 (2001): 151-178.
- Goodman, Theodore H., Monica Neamtiu, Nemit Shroff, and Hal D. White. "Management forecast quality and capital investment decisions." *The Accounting Review* 89, no. 1 (2014): 331-365.
- Gu, Feng, and Baruch Lev. "Overpriced shares, ill-advised acquisitions, and goodwill impairment." *The Accounting Review* 86.6 (2011): 1995-2022.
- Gregory, Alan. "An examination of the long run performance of UK acquiring firms." *Journal of Business Finance & Accounting* 24.7-8 (1997): 971-1002.
- Grinblatt, Mark, and Sheridan Titman, 2002, *Financial Markets and Corporate Strategy*, 2nd edition (McGraw Hill Irwin, New York).
- Harford, Jarrad. "Corporate cash reserves and acquisitions." *The Journal of Finance* 54.6 (1999): 1969-1997.
- Harford, Jarrad, and Kai Li. "Decoupling CEO wealth and firm performance: The case of acquiring CEOs." *The Journal of Finance* 62.2 (2007): 917-949.
- Healy, Paul M., Krishna G. Palepu, and Richard S. Ruback. "Does corporate performance improve after mergers?." *Journal of financial economics* 31.2 (1992): 135-175.
- Herman, Edward S., and Louis Lowenstein. "The efficiency effects of hostile takeovers." *Knights, Raiders and Targets* 211 (1988).
- Hietala, Pekka, Steven N. Kaplan, and David T. Robinson. What is the price of hubris? Using takeover battles to infer overpayments and synergies. No. w9264. National Bureau of Economic Research, 2002.
- Jensen, Michael C. "Agency costs of free cash flow, corporate finance, and takeovers." *The American economic review* 76.2 (1986): 323-329.
- Jensen, Michael C. "The modern industrial revolution, exit, and the failure of internal control systems." *the Journal of Finance* 48.3 (1993): 831-880.
- Johnson, T.L., and D. R. Petrone. 1998. Is Goodwill an Asset? *Accounting Horizons* 12 (3): 293–303.
- Li, Kevin K., and Richard G. Sloan. "Has goodwill accounting gone bad?." *Review of Accounting Studies* 22.2 (2017): 964-1003.
- Li, Z., Shroff, P. K., Venkataraman, R., & Zhang, I. X. (2011). Causes and consequences of goodwill impairment losses. *Review of Accounting Studies*, 16(4), 745-778.
- Lin, Chen, Micah S. Officer, and Hong Zou. "Directors' and officers' liability insurance and acquisition outcomes." *Journal of Financial Economics* 102.3 (2011): 507-525.
- Linn, Scott C., and Jeannette A. Switzer. "Are cash acquisitions associated with better postcombination operating performance than stock acquisitions?." *Journal of Banking & Finance* 25.6 (2001): 1113-1138.
- Loughran, Tim, and Jay R. Ritter. "The operating performance of firms conducting seasoned equity offerings." *The journal of finance* 52.5 (1997): 1823-1850.

- Maquieira, Carlos P., William L. Megginson, and Lance Nail. "Wealth creation versus wealth redistributions in pure stock-for-stock mergers1." *Journal of Financial Economics* 48.1 (1998): 3-33.
- Malmendier, Ulrike, Enrico Moretti, and Florian S. Peters. "Winning by losing: evidence on the long-run effects of mergers." *The Review of Financial Studies* 31, no. 8 (2018): 3212-3264.
- Mitchell, M., and Mulherin, J. The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics* 41 (1996): 193–229.
- Morck, Randall, Andrei Shleifer, and Robert W. Vishny. "Do managerial objectives drive bad acquisitions?." *The Journal of Finance* 45.1 (1990): 31-48.
- Mueller, Dennis C. "A life cycle theory of the firm." *The Journal of Industrial Economics* (1972): 199-219.
- Nohel, T. and Tarhan, V. Share repurchases and firm performance: new evidence on the agency costs of free cash flow. *Journal of Financial Economics* 49 (1998): 187–222.
- Ramanna, Karthik. "The implications of unverifiable fair-value accounting: Evidence from the political economy of goodwill accounting." *Journal of Accounting and Economics* 45.2-3 (2008): 253-281.
- Ramanna, Karthik, and Ross L. Watts. "Evidence on the use of unverifiable estimates in required goodwill impairment." *Review of Accounting Studies* 17.4 (2012): 749-780.
- Ramaswamy, K. P., and James F. Waagelein. "Firm financial performance following mergers." *Review of Quantitative Finance and Accounting* 20.2 (2003): 115-126.
- Ravenscraft, David J., and Frederic M. Scherer. "Mergers." *Sell-Offs, and Economic Efficiency*, (Washington, DC: Brookings Institution) (1987).
- Shalev, Ron. "The information content of business combination disclosure level." *The Accounting Review* 84.1 (2009): 239-270.
- Shalev, R. O. N., Ivy Xiying Zhang, and Yong Zhang. "CEO compensation and fair value accounting: Evidence from purchase price allocation." *Journal of Accounting Research* 51.4 (2013): 819-854.
- Shleifer, Andrei, and Robert W. Vishny. "Large shareholders and corporate control." *Journal of political economy* 94.3, Part 1 (1986): 461-488.
- Switzer, Jeannette A. "Evidence on real gains in corporate acquisitions." *Journal of Economics and Business* 48.5 (1996): 443-460.
- Vuong, Quang H. "Likelihood ratio tests for model selection and non-nested hypotheses." *Econometrica: Journal of the Econometric Society* (1989): 307-333.
- Wang, Cong, and Fei Xie. "Corporate governance transfer and synergistic gains from mergers and acquisitions." *The Review of Financial Studies* 22.2 (2009): 829-858.

Appendix 1: Purchase price components



Appendix 2: Conceptual framework of the Acquisition Premium



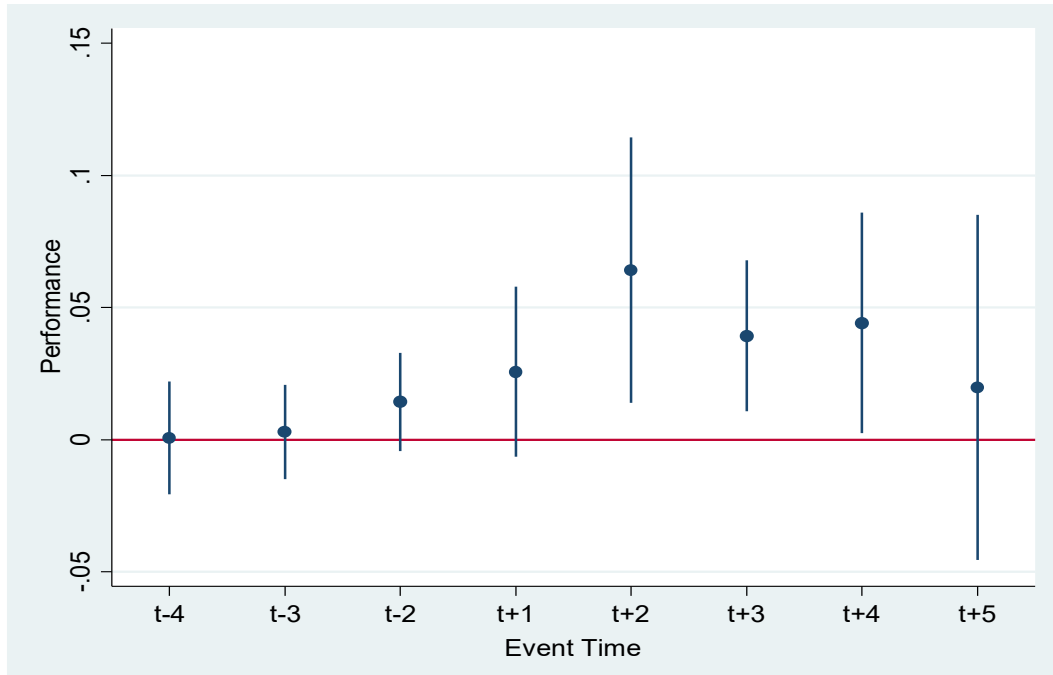
Acquisition Premium (1) is the purchased goodwill (in millions) paid by the acquirer over the fair value of the target's net assets. The purchased goodwill comes directly from the purchase price allocation disclosure in the acquirer's 10-K/Q.

Acquisition Premium (2) is the equity premium (in millions) paid by the acquirer over the market value of the target's equity before the acquisition announcement. The equity premium is measured as follows: (the offer price – the target's stock price four weeks prior to the acquisition announcement date) × the number of the target common shares outstanding (excluding treasury shares) from the most recent balance sheet available prior to the acquisition announcement. All variables are obtained from the SDC database.

Figure 1. Assessment of the Parallel Trend Assumption

This figure depicts the regression coefficient estimates and 95% confidence intervals (two-tailed) that map out the treatment effect by performance period. Panel A presents results using OCF1 as cash flow measure and Panel B presents results using OCF2 as cash flow measure.

Panel A: OCF1



Panel B: OCF2

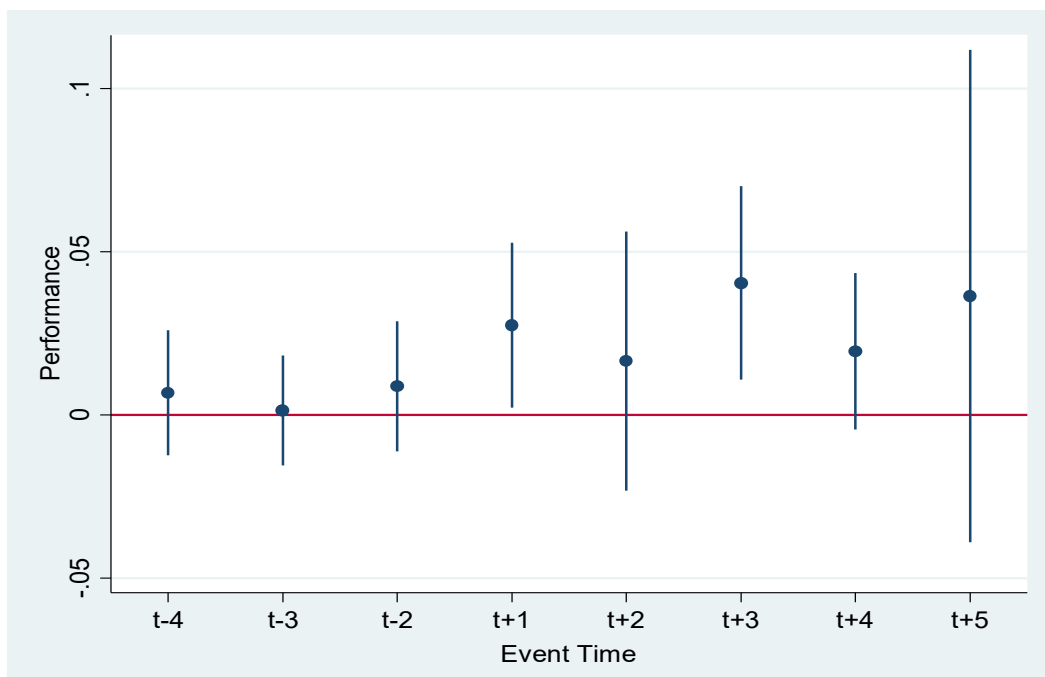


Table 1. Sample Selection Procedures

Description	Number of Acquisitions deleted	Number of Acquisitions left
The largest one hundred U.S. domestic acquisitions executed in each year between 2001 and 2011. Both the acquirer and the target are public companies and the acquirer purchases 100% of the target's equity as identified in the SDC.		1,100
Delete acquisitions completed before July 2001.	50	1,050
Delete if the acquirer engages in multiple acquisitions of 100% equity purchases within the sample period.	437	613
Require that Compustat and CRSP data are available for both the acquirer and the target.	159	454
Delete acquisitions involving financial and utility firms.	117	337
Require data for calculating the performance measures.	137	200
Require purchase price allocation data disclosures.	52	148

Table 2. Acquisition Characteristics**Panel A: Distribution of acquisitions by the completion year**

Completion year	Number of acquisitions	Percent (%)
2001 (July)	5	3.38
2002	14	9.46
2003	8	5.41
2004	13	8.78
2005	19	12.84
2006	16	10.81
2007	21	14.19
2008	14	9.46
2009	9	6.08
2010	19	12.84
2011	10	6.76
Total	148	100

Panel B: Distribution of acquisitions by the method of payment

Method of payments	Number of acquisitions	Percent (%)
Cash only	56	37.84
Stock only	19	12.84
Mixed	73	49.32
Total	148	100

Panel C: Distribution of acquisitions based on industry relatedness

Industry relatedness	Number of acquisitions	Percent (%)
Related	103	69.59
Nonrelated	45	30.41
Total	148	100

Panel D: Purchase price allocation and the acquisition premium (\$ million)

Variable	N	Mean	Std Dev	25th Pctl	Median	75th Pctl	Relative to purchase price (%)
Purchase price	148	3317	6609	502	1246	3380	100
Purchased Goodwill	148	1798	3772	215	672	1634	54
Fair value of Intangible assets	148	938	2857	60	165	582	28
Fair value of Tangible assets	148	581	3303	8	112	340	18
Fair value write-up	148	806	2284	37	139	632	24
Equity Premium	142	658	1439	65	212	582	20

Panel E: Correlation between the Purchased Goodwill and the Equity Premium

	(1)	(2)
(1) Purchased Goodwill		0.79***
(2) Equity Premium	0.71***	

Notes: Pearson pairwise correlations are presented in the upper diagonal and Spearman rank pairwise correlations are presented in the lower diagonal. *** indicates significant correlation at the 1% level.

Table 3. Post-merger abnormal operating performance and its association with the acquisition premium (Based on ABV approach: Cash flow measure is deflated by the purchase accounting effect-adjusted book value of assets)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	<i>Performance</i>	<i>Performance</i>	<i>Performance</i>	<i>Performance</i>	<i>Performance</i>	<i>Performance</i>
Cash flow measure	OCF1	OCF2	OCF1	OCF2	OCF1	OCF2
<i>Post</i>	-0.003 (-0.179)	-0.023 (-1.387)	-0.003 (-0.237)	-0.023 (-1.439)	-0.004 (-0.234)	-0.025 (-1.497)
<i>Post*Treat</i>	0.034*** (2.984)	0.024** (2.314)	-0.030 (-1.089)	-0.022 (-1.017)	0.005 (0.459)	-0.000 (-0.018)
<i>Post*Treat*GW</i>			0.178** (2.107)	0.126** (2.077)		
<i>Post*Treat*EP</i>					0.251** (2.184)	0.205* (1.877)
<i>Size</i>	-0.006 (-0.254)	-0.023 (-0.829)	-0.016 (-0.651)	-0.029 (-1.071)	-0.009 (-0.373)	-0.025 (-0.866)
<i>Leverage</i>	-0.004 (-1.038)	-0.001 (-0.314)	-0.005 (-1.268)	-0.001 (-0.326)	-0.003 (-0.845)	-0.001 (-0.130)
<i>MTB</i>	0.008** (2.527)	0.004** (2.575)	0.009** (2.217)	0.005*** (2.913)	0.009** (2.439)	0.005*** (2.685)
<i>Performance_Prior</i>	0.473*** (3.308)	0.395** (1.982)	0.389*** (3.230)	0.331* (1.821)	0.455*** (3.237)	0.375* (1.912)
<i>Constant†</i>	0.122 (0.717)	0.222 (1.175)	0.214 (1.258)	0.277 (1.479)	0.139 (0.818)	0.229 (1.183)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

Firm-year Obs	2,564	2,570	2,564	2,570	2,536	2,542
Adj. R ²	0.331	0.252	0.359	0.270	0.331	0.247

The asterisks *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, based on two-tailed tests. T-statistics are reported in parentheses. The estimated robust standard errors are clustered at the firm level. [†]The reported *Constant* is the average value of the fixed effects. OCF1 is pre-tax operating cash flow as net sales minus cost of goods sold minus selling and administrative expenses, plus depreciation and amortization expenses (Compustat item: OIBDP). OCF2 is cash flow from operations as reported on the Statement of Cash Flow (Compustat item: OANCF). Cash flow return on asset is cash flow measure (either OCF1 or OCF2) deflated by the book value of assets at the beginning of the year. The *adjusted book value* (ABV) of assets of the merged firm is used as a deflator during the post-merger periods. Following Healy et al. (1992) and Ghosh (2001), pre-merger returns on assets for the combined firm are weighted averages of target and acquirer returns, with the weights being the relative asset values of the two firms. Post-merger return on assets is that of the combined firm.

Table 4. Post-merger abnormal operating performance (Based on conventional performance measure from Healy et al. (1992) and Ghosh (2001): Cash flow measures are deflated by the market value of assets)

	(1)	(2)
Dependent Variable	<i>Performance</i>	<i>Performance</i>
Cash flow measure	OCF1	OCF2
<i>Post</i>	-0.005 (-0.613)	-0.004 (-0.696)
<i>Post*Treat</i>	0.003 (0.416)	-0.003 (-0.650)
<i>Size</i>	0.005 (0.663)	0.003 (0.708)
<i>Leverage</i>	-0.004** (-2.081)	0.000 (0.139)
<i>MTB</i>	0.004** (2.304)	0.001 (1.111)
<i>Performance_Prior</i>	0.003 (0.757)	0.172*** (4.393)
<i>Constant</i> [†]	0.040 (0.646)	0.011 (0.309)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
Firm-year Obs	2,610	2,609
Adj. R ²	0.451	0.433

The asterisks *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, based on two-tailed tests. T-statistics are reported in parentheses. The estimated robust standard errors are clustered at the acquirer firm level. [†]The reported *Constant* is the average value of the fixed effects.

Table 5. Cash flow return on assets relative to industry-median**Panel A: Pre-and post-merger cash flow return on assets**

Year relative to merger	OCF1				OCF2				Number of Acquisitions
	Merged firm median (%)	Merged firm mean (%)	Industry-adjusted mean* (%)	Matched firm-adjusted mean* (%)	Merged firm median (%)	Merged firm mean (%)	Industry-adjusted mean (%)	Matched firm-adjusted mean (%)	
-5	16.15	15.16	7.86	0.58	11.08	11.40	6.70	0.96	148
-4	15.20	15.54	8.62	0.80	11.11	11.76	7.03	1.13	148
-3	15.30	15.36	8.39	0.63	10.32	11.58	6.67	0.36	148
-2	15.07	16.13	8.90	1.60	11.20	12.07	6.67	0.75	148
-1	13.77	15.62	8.03	0.50	10.72	11.94	6.17	0.09	148
1	15.47	17.34	9.44	2.24	11.05	12.55	6.89	2.05	148
2	16.20	20.84	13.47	6.88	11.96	12.58	7.13	1.89	148
3	16.34	20.34	13.20	6.67	12.20	15.26	10.07	4.34	148
4	16.30	21.05	14.08	6.93	12.09	14.29	9.10	3.25	148
5	15.09	17.92	11.37	4.66	12.81	14.98	9.85	4.41	148
Mean (pre)	15.10	15.56	8.36	0.82	10.89	11.75	6.65	0.66	
Mean (post)	15.88	19.50	12.31	5.48	12.02	13.93	8.61	3.19	
Post-Pre	0.78	3.94	3.95	4.65	1.14	2.18	1.96	2.53	

Notes:

*Industry-adjusted cash rates of return are merged firm returns less the median firm's rate of return as in Healy et al. (1992). Matched firm-adjusted cash rates of return are merged firm returns less that of the matched firm's rate of return as in Ghosh (2001).

Panel B: Healy et al. (1992) cross-sectional regression

$$\text{Specification: } IACR_{post,i} = \alpha + \beta IACR_{pre,i} + \varepsilon_i$$

Dependent Variable	(1)	(2)
	$IACR_{post,i}$	$IACR_{post,i}$
Cash flow measure	OCF1	OCF2
<i>Intercept</i>	0.088*** (3.77)	0.056*** (3.49)
<i>Pre_ROA_Ind</i>	0.366** (2.25)	0.475*** (3.03)
Observations	148	148
Adj Rsquared	0.027	0.0526
F-value	5.08**	9.16***

Notes:

$IACR_{post,i}$ and $IACR_{pre,i}$ are, respectively, the median industry-adjusted cash flow returns on assets from the 5-year post- and the pre-merger periods for each firm i . Following Healy et al. (1992), pre-merger returns for the combined firm are calculated as weighted averages of the target and the acquirer returns, with the weights being the relative asset values of the two firms. Post-merger returns use data for the merged firms. Pre-merger industry returns are weighted averages of target and acquirer industry median returns (2-

digit SIC), with the weights being the relative asset values of the acquirer and target firms each year. In the post-merger period the weights used to compute industry returns are the relative asset values of the acquirer and target firms in year - 1. The asterisks *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, based on two-tailed tests. T-statistics are reported in parentheses.

Panel C: Ghosh (2001) change model

$$\Delta MACR_i = MACR_{i,post} - MACR_{i,pre}$$

Null hypothesis: $\Delta MACR_i = 0$

	(1)	(2)
Cash flow measure	OCF1	OCF2
$\Delta MACR_i$	4.7%** (2.60)	3.4%*** (3.05)

Notes:

Following Ghosh (2001), pro-forma performance of merged firms for pre-merger years are constructed by aggregating acquiring and target firms' performance. Pro-forma performance of matched firms is constructed by aggregating the performance of the acquirer-matched firm and the target-matched firms. $MACR_{i,post} = median(MRG_{i,t} - MAT_{i,t})_{post}$ represents the median of the matched-firm-adjusted cash flow returns ($MACR$) over the years 1 to 5, where $MRG_{i,t}$ is the merged firm's cash flow return and $MAT_{i,t}$ is the matched firm's cash flow return, for firm i time t . $MACR_{i,pre} = (MRG_{i,t-1} - MAT_{i,t-1})$ represents the cash flow return less the matched firm's cash flow return for firm i and time $t-1$. Pre-merger returns are measured only in year $t-1$ because the matching on size and performance is done in year -1 . The asterisks *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, based on two-tailed tests. T-statistics are reported in parentheses.